What is claimed is:

1. A method of synthesizing carbon nanotubes, comprising the steps of:
introducing a catalyst in a reactor;
supplying a reactant gas containing a carbon source gas over the catalyst;
selectively and locally heating the catalyst in the reactor; and
growing carbon nanotubes from the heated catalyst.

2. The method of claim 1, wherein the catalyst is formed of a transition metal such as iron, nickel or cobalt; metal sulfide, metal carbide, metal oxide or metal salt of the transition metal; or an organic compound containing the transition metal.

3. The method of claim 1, wherein the catalyst is loaded on a support by an impregnation method, an incipient wetness method or an ion-exchange method and is supplied into the reactor in a powder state.

4. The method of claim 1, wherein the catalyst is loaded on a substrate by a deposition method, a painting method and a spray method to be supplied into the reactor.

5. The method of claim 1, wherein for the catalyst, a metal precursor is loaded on a substrate or a support and changed into a metal phase through reduction, calcination, sulfiding or carbonization, and the metal catalyst is supplied into the reactor.

6. The method of claim 1, wherein for the catalyst, metal sulfide obtained by sulfiding a metal precursor with hydrogen sulfide is used.

7. The method of claim 1, wherein the catalyst is supplied into the reactor in the form of a catalyst precursor in gas phase.

8. The method of claim 7, wherein the catalyst precursor is ferrocene or iron pentacarbonyl.

9. The method of claim 1, wherein the carbon source gas contains one selected from the group consisting of acetylene, methane, propane and benzene.

10. The method of claim 1, wherein the reactant gas further comprises hydrogen gas or inert gas.

11. The method of claim 1, wherein the reactant gas further comprises hydrogen sulfide (H_2S) gas.

12. The method of claim 1, wherein the local heating of the catalyst is performed by irradiation of microwaves.

13. The method of claim 1, wherein the local heating of the catalyst is performed by electromagnetic inductive heating.

14. The method of claim 1, wherein the local heating of the catalyst is performed by laser heating.

15. The method of claim 1, wherein the local heating of the catalyst is performed by radio frequency heating.

16. An apparatus for synthesizing carbon nanotubes, comprising:
a reactor for receiving a catalyst;
a reactant gas supplier for supplying a carbon source gas into the reactor; and
a local heater for selectively heating the catalyst received in the reactor.